of the principles of ornamental art to be found in the human figure. He considered that the proposition that a student who knew the figure, and drew it well, was therefore capable of drawing and designing other things equally well, was a fallacy, and shewed that though all the principles of a pure type were to be found in the human figure, yet it was all useless unless the student could read, and understand it with reference to his own pursuits. This implied that the student had already studied ornament, for unless he had done so he could not possibly see the analogy, and therefore, to the student whose perceptions have to be cultivated, whose mind has to be stored with images as varied as his artistic wants, the study of one type only, however perfect, is merely the study of one book, on one subject, which, however excellent itself, will not prove much of an instructor beyond the subject on which it treats. To know ornament well, it must be studied for its own sake. A knowledge of the figure would, no doubt, be of great assistance to the intelligent student; but this depended in a great measure upon how he had been taught, for experience had shewn that it had been a stumbling block to those of small capacity, as begetting a conceit of their own powers totally incompatible with their knowledge and ability. But he yielded to no one in his estimation of its high value to the ornamentist equally with the historic artist. Both should be well, thoroughly well taught. Nay, in some instances, he maintained, the ornamentist should be able to draw it with more severity, from the fact of using it without the adjuncts of a back ground; and thus, like the sculptor, his figure must speak for itself without the accessories of a picture.

Roman design, and the spirit in which art was wrought out by these mighty rulers of their age, were exemplified by their treatment of the Corinthian. Grandeur and magnificence was the point at which the Romans aimed, and mistaking bigness for the former, and the overloaded effects of ornamental details for the latter, they lost the purity and simplicity which characterised the works of the Greeks, which they were so ambitious of rivalling. Their mechanical use of the acanthus was forcibly demonstrated, and the clumsy adaptation of geometry to the production of mouldings, instead of using the hand-curve of the Greeks, was also pointed out. The use of the spiral as a primary element in ornament, was also demonstrated, and the different use to which it was put by the Greeks, as compared with the Romans, very plainly shewn. The use of relievi, however, formed one of the most interesting points in this lecture, but would occupy too much space for us to do justice to it; as also the consideration of Etruscan art, which was shewn to be essentially Greek in its principles. The method of construction adopted in the forms of the vases was demonstrated. Pompeiian design was illustrated by admirably executed drawings of large size and excellent effect. The polychromatic effects were traced back to Egyptian art, and the forms shewn to be based on Greek, with a Roman feeling in the adaptation, and the combination of the historic with the ornamental, was shewn as an exemplar for our guidance in decoration, particularly as Pompeiian art is in a great degree domestic in its application.

The transition from pagan to Christian art, was a result which arose out of the transfer of the seat of the Roman empire from Rome to Byzantium. This change was attributed to those Greek artists who followed the Emperor Constantine to this city of the east, and their adaptation of the fragmentary constructions of the western empire to the requirements of their new faith, modified in a degree by an Asiatic peculiarity in all probability found already existing in the city to which Constantine desired to revive all the glories of Memphis, of Tyre, of Athens, and of Rome. Byzantine design, as the earliest Christian was proved to be essentially mosaic in its character, and this might probably have originated in a degree in some of the peculiarities of early Persaic art. The identity of the relievi of the Byzantine with Saxon and Norman art was fully proved. Persian, Turkish, and Moresque design were each considered, and the adaptation of the principle of the Greek fret to Turkish decoration was shewn to consist in the use of the diagonal instead of the perpendicular and horizontal lines only. The Moresque style was illustrated, and the peculiar character of the ornaments traced out, and illustrated by reference to the simplest principles of geometry. Early Italian art followed, and the works of Cimabue, and his pupil Giotto, were quoted as examples of that spiritualization in design which reached its perfection under Raffaelle. The arabesques of this prince of painters were quoted as a proof how thoroughly he understood every thing appertaining to his art; and the works of his pupils, Julio Romano and Giovanni da Udine, were further evidence of the value of his school in the training of true artists. British art, as the perfection of Gothic design, to use the popular phrase, formed an admirable field for disquisition, and the lecturer proved how completely and perfectly the arts were at one time developed in Britain. Illuminated MSS., decorated silks and velvets, stained-glass windows, ornamental ironwork, and the painted and gilded effects produced in the decorations of the cathedrals of this country were glanced at.

Italian art in the 16th century, and the absurdities of Bernini and Borromini were next noticed. The advent of the Renaissance in the works of that artist-goldsmith Benvenuto Cellini was considered, and a rapid glance taken of the style of Francis I., of France, as displayed at Fontainebleau. The Italian origin of French art was thus traced through, and the employment of such men as Rubens, Poussin, and Philip de la Champagne, in the decorations of a room in the Luxembourg, quoted as a proof that artists were in those times much more of workmen than at present. Elizabethan, and the domestic architecture and decorations of the Tudor age next received attention, and the carved furniture of the period quoted as a proof how largely art entered into the service of every-day life. The classic revival which occurred after the restoration, was argued as having done more injury to true art than all the destruction and whitewash of the puritans, and the no-taste displayed in some of the continental cathedrals, in the placing of classic screens across Gothic buildings, shewn to have originated in the same source with much of the literature of the time—a constant following after classic models. The leading features of the style of Louis XIV. was then explained, and the sentiment in which it originated proved to be that of self-glorification, a perversion of the true purposes of art from the embellishment of religion, morality, and patriotism, to that of vain-glory. Louis XV. and the pastoral school were glanced at, and Chinese, as a *modern* style, was argued as possessing the essential principles of a true style of decoration. Modern French being compared with modern German, the sentiment of the latter was shewn to be superior alike in originality and purity.

The course of lectures was concluded by some appropriate remarks as to the present state of the arts in Britain, and the *material* was denounced as standing in the way of the *spiritual*. The British public looked for matter-of-fact productions, not for the elevation to be found in the ideal. Our ornamentists were little else but dove-tailers of the odds and ends of every style of every age; and instead of looking to principles first, as arising out of the study of the antique, then to nature as a new source from whence to adapt forms for the illustration of their own age, country, and literature, they either slavishly copied all that had preceded them on the one hand, or totally neglected every thing in the shape of ornament on the other; consequently our schools formed nothing but puny painters of pretty pictures, ambitious spoilers of colours and canvass, whose ideas never ranged beyond dog-kennels or heaps of lumber.

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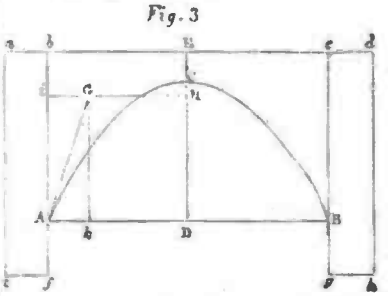
New Churches.—At a meeting, held last week, of the Society for Enlarging, Building, and Repairing Churches and Chapels, grants were made in aid of the erection of new churches as follows: at Collier-street, in the parish of Yalding, near Maidstone, and at Wolsden, in the parish of Rochdale. For rebuilding, with enlargement, the parish churches of Llangaffno, near Carnarvon; Shalford, near Guildford; Wambrook, near Chard (the town excepted), and Aspatria, near Carlisle. Also for erecting transepts to the Church of St. Barnabas, Liverpool, erected in the year 1841.

## ON THE EQUILIBRIUM OF PIERS.

The cases of this problem previously illustrated had reference to the semi-circular and segmental arches proposed in the second volume of Dr. Hutton's course of mathematics (see p. 8, *ante*); but since arches are frequently built of other forms, such as the *parabola*, the *ellipsis*, the *hyperbola*, the *cycloid*, the *curve of equilibration*, &c., we should consider the solution of the problem as being incomplete if these other curves were omitted, but more especially the *ellipsis*, the *hyperbola*, the *cycloid*, and the *curve of equilibration*. The *parabola* being used only on certain occasions, is of less importance, but since it *does* sometimes occur in military works, it may be as well to bestow a little attention on it, and because it is somewhat simpler in its nature, than any of the other curves just mentioned, we will begin our investigations with it.

Let ACB fig. 3, be a parabolic arch, of which AB is the span, DC the axis or rise, CE the thickness at the crown or length of the key-stone, and *abfe*, *cdhg* the piers by which it is supported, the road-way and the top of the piers being in the same horizontal

*Fig. 3*




plane; it is required to determine the thickness of the pier to support the arch in equilibrio without the reaction of any other arch; the piers being of the same rectangular form as represented in the drawing.

Since the axis CD bisects the arch ACB in C, it divides it into two equal and symmetrical portions AC and BC, and for this reason, the mixed figures ACE*b*, BCE*c*, contained between the arch, the piers and the roadway, are also equal and similar with respect to the portions of the arch on which they rest; it therefore appears, that each pier must sustain one half of the materials that constitute the arch, so that the area ACE*b*, is a proper representative of the weight of the materials which the pier has to sustain.

Let G be the position of the centre of gravity of the area ACE*b*, and through the point G draw iH parallel, and G*k* perpendicular to the horizon, and draw the diagonal GA; then, since the point G is the centre of gravity of the semi-arch ACE*b*, it may be considered as the place of that semi-arch; for by the principles of mechanics, if the whole mass were concentrated in the point G, it would produce the same effect on the pier as is produced in the usual state of a balanced arch; consequently, if the vertical line G*k* denote the weight of the incumbent materials, or the tendency of the semi-arch to descend in the direction of gravity, then will *k*A denote the horizontal thrust against the pier, to turn it about the point *e*, that angle of the pier acting on the ground as a fulcrum. This, however, supposes that the pier is free to move about the point *e*, and that there is no resistance offered to the thrust by friction, or the adhesion of the mortar.

If we conceive the horizontal force which acts in the direction *k*A, to be exerted at the extremity of a lever A*f*; then its momentum to overturn the pier will be *k*A × A*f*. Now, if the whole effort of the weight in the direction of gravity be represented by *w*, that portion of it which acts in the direction *k*A, will be $\frac{w \cdot kA}{Gk}$; for according to the *parallelogram of forces*, it is

$$Gk : kA :: w : \frac{w \cdot kA}{Gk}$$

Therefore, by substituting this result for *k*A in the expression for the momentum to overturn the pier, we get

$$kA \times Af = \frac{w \cdot kA \cdot Af}{Gk},$$

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